

PERFORMANCE INDICATOR AND NOTIFICATION SYSTEM

Field of the Invention

[0001] This invention relates to a monitoring system and more particularly to a system that monitors business operations performance against pre-established criteria and provides notification when the performance deviates from such criteria.

Background of the Invention

[0002] Over the last several decades there has been increasing focus on environmental protection, and expanding government regulations have made it incumbent upon industry to monitor activities that could affect the environment. In addition to regulatory requirements, companies could establish voluntary metrics as indicators of their environmental performance. As a result, information technology (IT) tools have been developed to gather and process information that affect the environment.

[0003] Prior environmental information management systems generally relied on a questionnaire or worksheet to collect information on an as-needed basis in response to a management decision or the request of an external interested party which usually results in emergency information hunts and last-minute "guesstimates." Since these unplanned information collection requests are oftentimes initiated by pressure from some current environmental concern or crisis, the information provided under such circumstances represents a snap shot of a situation and does not provide for a meaningful performance indicator or for trend analysis. In addition, because an unplanned approach to information gathering is people-dependent, the information is interpreted by both the individuals requesting and reporting the information, leading to inconsistencies.

[0004] Moreover with increasing globalization, enterprises need a mechanism for

comprehensively and concurrently monitoring their environmental information across all of their sites as well as on a site-by-site basis. To date there has been no system to accommodate such a comprehensive monitoring of environmental performance and notification scheme.

Summary of the Invention

[0005] The present invention provides a method for monitoring performance information and providing notification when that information indicates performance reaches a certain level. A plurality of forms with instructions that require performance information as a function of uniform data definitions are accepted from multiple sites. After the forms are completed, also known as documents, their information is stored in one or more databases as a function of an area of interest, which could be an environmental medium such as air, water, waste and organized by site, business unit or country, and so on. Information submitted by sites are compared to the pre-established performance criteria stored in the database for determining conformance with such criteria. Any information that does not conform is flagged and a conformance report is generated. Databases may be set up to generate conformance reports either automatically or manually. Additionally, notification is provided to the appropriate parties, such as environmental professionals, when the performance information does not conform with the pre-established performance criteria. Like conformance reports themselves, databases may be set up to send notifications either automatically or manually.

[0006] A system implements the preceding method with a processor operably connected to a data storage device. The data storage device further comprises a number of individual storage units, each of the units stores a predetermined type of data by area of interest. An application resides on the data storage device and is executable by the processor to implement the foregoing method by providing the blank forms, accepting the

documents and storing the information in its particular storage unit. The program administrators set the performance criteria in the data storage units and the application performs the necessary monitoring, flagging, report generation and notification.

[0007] In other embodiments of the present invention, executable computer control process steps operative to control a computer are stored on a computer-readable medium for monitoring performance information in accordance with the method of the present invention.

Brief Description of the Drawings

[0008] Figure 1 shows a communications network according to the present invention.

Detailed Description of the Preferred Embodiments

[0009] An information collection and management system, referred to as the Environmental Master Plan, or EMP, is provided with pre-planned reporting requirements that require reporting of specific information at specific times by a predetermined schedule to ensure capturing of key performance indicators and consistency in data reporting by operating as a global application requiring the same data from all reporting locations using the same definitions. In effect, the system provides a central place where consistent global performance information is identified, stored and accessed. The end result is consistent, reliable, and meaningful information for measuring and managing environmental performance to communicate internally, to the public and to governmental agencies, the progress that is made in a broad spectrum of environmental areas across an entire enterprise.

[0010] A Performance Indicator and Notification System (PINS) is included in the system to (1) establish performance criteria in a consistent and predetermined manner,

and (2) to notify corporate staff and other environmental professionals regarding nonconformance to established performance criteria, as well as flagging these non-conformities in the system databases. In effect, the PINS provides a mechanism for assessing environmental performance on a real-time basis and allowing immediate notification to corporate staff or other environmental professionals when performance data deviates from the established criteria.

[0011] Referring to Fig. 1, there is shown the EMP according to the present invention, preferably implemented as an IT tool residing on a server 10 connected to a communications network 20. The tool is operably connected to a number of databases 12, each one housing information for a distinct area of interest, which may include:

- air
- water
- waste
- energy
- toxic chemical release inventory
- containment
- regulatory activity
- cost and savings
- facility general information
- database meta information
- health and safety information
- materials use and conservation information

Any number of databases may be added to the system to contain any type of information considered pertinent.

[0012] A number of sites 22 are connected to the network 20 to communicate with the

server 10. The sites 22 may be manufacturing facilities, corporate headquarters, or individual employees conducting environmental field tests to name a few examples. A corresponding client-side tool resides on a computer at each site 22 configured to communicate over the network 20 to provide an interface between users and the system.

[0013] A form is used to report performance information from each site 22 and enter it into its corresponding database 12. Instructions and definitions used in completing the form are provided as part of the system so that those completing the forms know exactly what is required, eliminating any guesswork on their part, and those using the information reported in the forms understand it in the correct context. For example, assume there is a toxic chemical release inventory (TCRI) database with a corresponding form that requires the reporting facility to provide data on the annual use of a chemical, the amount of that chemical released into the air, water and land, the amount disposed of off-site, recycled on and off site, treated on and off site, as well as energy recovery on and off-site.

[0014] Security in the system is implemented by assigning a specific access level to each user. In a preferred embodiment, there are three levels: reader, author and editor. A reader is limited to viewing documents, which are completed forms, only. An author can view documents, create documents, and modify the documents he or she created. An editor can read, create and modify all documents. As an added security feature, an audit trail is automatically created for each document. At the creation of a document, it is stamped with the name of the author and the creation date. Each time the document is modified, the name of the user that made the modification and the date of the edit are added to the audit trail.

[0015] Reported data is aggregated by the EMP and maintained so that information is accessible by any user with proper authorization. Queries can be created to summarize

the data and produce useful management information. For example, with reference to the TCRI example discussed earlier, information can be sorted by geography, country and sites, allowing a reviewer to compare performance among geographical areas, countries and sites. Alternatively, the information can be sorted by a specific chemical to study a chemical's use rate and disposition across a company.

[0016] The PINS electronically enables data limits within the EMP by applying a high or low limit to information in the system databases. Depending on several factors, including the EMP database design, established environmental goals and measurement period, the limit of a certain criterion is set as a "high" or "low" limit. Performance results and the pre-established limit are compared and a determination is made whether the performance data exceeds or falls short of the limit, whichever applies. Any data exceeding or falling below a limit will cause that information to be flagged and a notification sent to the appropriate parties, such as environmental managers and professionals, by an electronic communication system linked to the EMP databases, like an e-mail system. In this way, performance is monitored in real-time and notification is provided substantially concurrently for sub-par performance. Additionally, reports generated by the system reflect all the stored information at the time the report is generated. This allows any site with sub-par performance to learn the impact of an individual location on overall company performance. Further, if a user at one site were to input data that exceeds a company-wide limit, it will trigger notification to all sites.

[0017] To illustrate the possibilities of the database configuration, consider the following, as examples:

- Air Programs Database -- an air emissions "high" limit can be set at a specified emission level for a particular chemical for the current year.
- Waste Management Database -- a "low" limit can be set for recycling quantities or

percentage rates of nonhazardous and hazardous waste for a given time period, such as a quarter.

- Energy database -- a “high” limit could be set at a level when submitted data shows that energy consumption has surpassed the previous year’s use for the same time period. Likewise, a “low” limit could be set at a level when data provided show that energy conservation savings is below a site’s current year plan.
- Cost and Savings Database -- a “low” limit could be set for a ratio indicating the savings of current operations versus the savings over some past time period to ensure that economic efficiency does not fall below a predetermined level.

[0018] In this way, performance data criteria may be set at a global, regional or site level. This flexible system for setting performance levels allows for site-specific criteria to be set for a facility while corporate-wide criteria to be set for goals affecting all or some locations.

[0019] Further functions of the PINS are:

- Control documents -- created with instructions for use by authorized users to set performance criteria in the EMP databases.
- Performance Indicator Report -- the application compares the submitted data against the predetermined criteria at a pre-established review period (e.g., monthly, quarterly) and automatically generates a nonconformance report in accordance to the database design. Moreover, a software agent would be created to allow manual generation of a report. Under this scheme, an authorized user can activate the agent as required to manually generate desired reports.
- Notification -- based on the Performance Indicator Report and where nonconformance exists, notification is sent to the appropriate persons, alerting the person to review the particular nonconformity. Notification may be sent by any

method suitable to provide the necessary information to the appropriate parties.

For example, e-mail sent over the communication network, a voice mail message, or text message displayed on an alphanumeric pager.

- Flagging -- nonconformance entries into their respective databases are flagged so that users can view the current status of environmental performance data against the performance criteria. Flagging may be done a number of ways, depending on the database design. For example, a nonconformity view for each database can be provided which lists all nonconformity data for a specific database by some criteria, such as geography or site.

[0020] Security is extended from the EMP to the PINS by only allowing authorized users, such as those assigned editor status, to establish limits. The audit trails will be updated whenever an access occurs by adding the person's name along with the time and date of the access into the audit file.

[0021] In effect, the PINS provides a data collection tool with a feedback mechanism enabling locations to make use of the input to improve performance immediately, before the end of a measurement period. PINS provides real-time analysis of performance data, as opposed to a retrospective view on performance passed the elapsed measurement period so that comprehensive company-wide monitoring of performance is accomplished in a manner such that data entered in a single site is accessible, in real-time, at other sites to perform thresholding on limits set at multiple sites, all sites, or just the local site. PINS makes the entire process of performance tracking against criteria systematic, timely and efficient; and turns lagging indicators into leading indicators by way of providing real-time performance feedback. Further, PINS allows for effective comparisons of present environmental performance data with proposed regulation. Should a governmental agency propose a new regulation or environmental limit, setting the new

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limit in the PINS allows the company to see the impact on a specific site, region or the entire company. The new regulation will cause modified performance criteria and the system may be configured to review the previously entered information in the databases for all non-conformities that may result.

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